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KARST-SPELEOLOGICAL STATION OF THE "PREDURAL'YE" NATIONAL RESERVE

L. V. Golubeva

The Kungur National Reserve, known as "Predural'ye," is located in Molotov Oblast, east of the city of Kungur in a picturesque region along the banks of the Sylva River between the villages of Filippovskiy and Ust'-Kishert'. Organized in 1945 it was at first managed by Molotov University, but at the end of 1945 it was transferred to the university's Institute of Natural Sciences.

One of the basic problems connected with the National Reserve is the clarification of its natural conditions, in particular, its geomorphology, karst phenomena, vegetation, and climate. Nature studies are supervised by three scientific stations: the biological, meteorological, and speleological stations.

The Speleological Station was founded in 1946 to organize and carry out scientific research on the karst phenomena and caverns found chiefly in the region of the foothills and western slope of the Urals. The station is under the Geological Department of the Institute of Natural Sciences, directed by Prof G. A. Maksimovich. It began its work by studying karst phenomena in the territory of the National Reserve. For some time interesting discoveries along the shores of the Sylva and the complex nature of its environs had attracted many geologists and geological parties to the district. But only very broad outlines of the geomorphological nature of the region were given in geological and some few geomorphological works. No detailed geomorphological map existed. Therefore, the first step was for the station to make such a map together with a description of the chief karst formations.

In the summer of 1946, L. V. Golubeva, V. V. Kovina, K. P. Shatalova, A. N. Gulyayeva, P. A. Popkova, K. A. Gorbunova, and K. K. Rubtsova, under the direction of Prof G. A. Maksimovich, made a geomorphological survey of the National Reserve territory and neighboring sections covering an area of about 400 square kilometers.

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By 1947 the National Reserve had been photographed and a detailed description had been made of its karst forms. Within an area of 25 square kilometers, 453 sinks were recorded. To study the dynamics of karst processes and establish future changes and growth in karst forms, meticulous surveying was done on some sink holes.

Research in 1946-47 demonstrated that, from the geomorphological standpoint, the National Reserve area could be divided into three parts: the Sylva valley, ravines, and high plain. In the region where Lower Permian rock developed, the Sylva runs through a narrow valley with high, steep slopes. Limestone crags rise on these slopes. These with the canyon-like ravines give the impression of a mountain landscape. There is only one well-defined narrow river terrace.

There are a large number of ravines in the region. Their formation is related to the erosive and lixiviating action of subterranean water. Some of the ravines resemble suspended valleys, including the Kamennyy, Sredne-Kamayskiy, and others. Unlike mountain landscapes, the high plains of the river valley have a level, somewhat broken surface, a circumstance which is connected with the geological structure of the region and the story of its development.

The karst rocks are the limestone and dolomites of the Artinskian and Kungurian strata. The karst conforms to valley slopes, ravines, and high plains. The surface shows sinks, potholes, and gullies or karst river valleys, while the underground manifestations are caves.

The most frequent form is the sink which is usually caused by lixiviation. The forms of the sinks are usually cone-like, pot-shaped or cup-shaped, although complicated forms are also found. They vary from one to 40 meters in diameter, and in depth from 0.5 to 10 or 12 meters. The diameters are usually 3 to 6 meters. Karst gullies, formed by the merging of several sinks, are usually near the upper ends of ravines and are from 200 to 250 meters long. The bottoms of most ravines have some very deep sections.

The Sukhaya Rechka is one of the karst rivers. Its course is above ground only at its source. When the stream disappears, it leaves a ravine the whole extent of which remains dry most of the year. The caves, which are underground karst forms, are small and occur in Artinskian limestone cliffs 50-70 meters above the river level. Most of them are grottoes with flat ceilings.

Karst forms are distributed very unevenly and are concentrated in clusters or fields. The intensity of the karst process depends on topography and lithology and diminishes in proportion to the distance from the Sylva valley and the ravines. The greatest manifestations of karst are the riverain parts of the flatland, the upper, slanting parts of the slopes and the ravine towards their center and near the source of the river. Here karst rocks either emerge on the surface or lie very close to it.

A relation can be observed between karst formation and fissured rock. The direction of the long axis of sinks, gullies, caves, and ravines coincides with the predominant direction of a fissure. In the riverain sections of the plain and in the upper and middle parts of ravines, sinks in various stages of development can be observed. The caves differ in age -- young forms occur side by side with old and well-developed formations.

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The development of karst is closely connected with the general history of the topographical formation and the hydrographic networks. One can see that the stratal distribution of surface and subterranean karst forms is connected with the development of surface leveling and the formation of hydrographic networks accompanied by valley formation.

Karst phenomena produce a profound impression on the hydrogeology of the region. Subterranean streams occur at a great depth in the high plain; hence, there are few wells, and even where they exist it is necessary to use the surface water.

In addition to studying the morphology and karst phenomena of the National Reserve, the station carries on other work. To attract more people to the study of the Ural karst, L. V. Golubeva, head of the station, with Prof G. A. Maksimovich, head of the Department of Geology, compiled a report on the station. It was printed and sent to technical petroleum schools, teachers of intermediate municipal and regional schools of Molotov, Chelyabinsk, and Sverdlovsk oblasts, and to regional museums. Requests for the report came from the Ural Geographic Institute, the Ural Gold Trust, the Crimean Pedagogical Institute, Kazan University, and from many individuals interested in karst problems.

In January 1947 the station, together with the Institute of Natural Sciences and the Chair of Dynamic Geology of Molotov University, took an active part in organizing the Karst Conference in the city of Molotov. Representatives of Moscow, Leningrad, Sverdlovsk, Voronezh, Kazan, Simferopol', Krasnodar, and other cities also participated. Forty-eight reports were read. K. P. Plyusnin, corresponding secretary of the station, reported on karst in Ordinsk Rayon, Molotov Oblast.

A resolution of the conference noted the great karst development in the USSR and the advisability of creating a separate branch of scientific knowledge -- karst study. The conference resolved to convene an all-Union conference in the summer of 1949 and to include in its agenda excursions to typical karst regions of the USSR. Theses printed for the conference form a 6-quire handbook. In addition, the works of the conference were printed in the form of symposia on karst study.

A museum, established at the station, contains specimens of karst rock (limestones, dolomites, gypsum, and anhydrides) and models of the National Reserve territory and adjacent sections.

The station is a base for training geomorphologists of the Faculty of Molotov University in the knowledge of karst.

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